

The Listing of the Claims:

This listing of claims will replace all prior versions and listing of claims in the application.

1. (currently amended) A serine recombinase comprising a catalytic domain and a DNA binding domain wherein:
 - a. said catalytic domain is mutated at G101 or at a position corresponding to G101 of Tn3 resolvase (SEQ ID NO: 2); and
 - b. said serine recombinase contains one or more additional mutations at a position selected from the group consisting of L105, V107, A117, A89, F92, L66, G70, M76, T109 and R121; or a position corresponding to L105, V107, A117, A89, F92, L66, G70, M76, T109, and R121 of Tn3 resolvase (SEQ ID NO: 2).
2. (currently amended) A ~~The~~ serine recombinase according to claim 1 wherein the mutation at G101 is G101S.
3. (currently amended) A serine recombinase consisting of a catalytic domain and a DNA binding domain wherein said catalytic domain contains a single mutation at G101 or at a position corresponding to G101 of Tn3 resolvase (SEQ ID NO: 2) according to claim 1, further comprising comprising a ~~eatalytic domain and a DNA binding domain wherein said catalytic domain is mutated at Q105 or at a position corresponding to Q105 of Tn3 resolvase.~~
4. (currently amended) A serine recombinase consisting of the amino acid sequence of SEQ ID NO: 2 wherein said amino acid sequence contains a single mutation at G101 according to claim 3 ~~wherein the mutation is Q105L.~~
5. (cancelled)
6. (cancelled)
7. (currently amended) A ~~The~~ serine recombinase according to claim 1 further comprising one or more additional mutations selected from the group consisting of L105Q, V107M, V107L, V107F, Q105L, A117V, R121K, E124Q, E124A, A89T, F92S, and M103I or at positions corresponding to these mutations in Tn3 resolvase.

8. (currently amended) A The serine recombinase according to claim 1 further comprising ~~[[a]]~~ one or more mutations of the surface residues corresponding to a '2,3' interface.
9. (currently amended) A The serine recombinase according to claim 8 wherein the one or more mutations of the surface residues corresponding to a '2,3' interface include R2A and E56K or positions corresponding to R2A and E56K in Tn3 resolvase.
10. (currently amended) A The serine recombinase according to claim 1 wherein the one or more mutations are selected from the group consisting of L105Q, V107M, V107L, V107F, Q105L, A117V, R121K, E124Q, E124A, A89T, F92S and M103I ~~further comprising a one or more mutations of the surface residues corresponding to a '1,2' interface.~~
11. (cancelled)
12. (currently amended) A The serine recombinase according to claim 1 further comprising the mutations R2A, E56K, G101S, D102Y, M103I and Q105L or the positions corresponding to these mutations in Tn3 resolvase (SEQ ID NO: 2).
13. (currently amended) A The serine recombinase according to claim 12 further comprising the mutation V107F or the position corresponding to this mutation in Tn3 resolvase (SEQ ID NO: 2).
14. (currently amended) A The serine recombinase according to claim 1 which is selected from the group consisting of Tn3 resolvase, Sin recombinase, y6 resolvase, Tn 21 resolvase, R resolvase, ISXc5 resolvase, Gin resolvase, Hin resolvase, Methanococcus jannaschii.resolvase, 15667 resolvase, ccrA1 resolvase, TN4451 resolvase, TP901-1 resolvase and OC31 resolvase.
15. (cancelled)
16. (cancelled)
17. (cancelled)

18. (currently amended) A hybrid recombinase comprising a catalytic domain from a serine recombinase connected by way of a linker to a heterologous DNA binding domain wherein said hybrid recombinase is capable of binding nucleic acid by way of said DNA binding domain and ~~said~~ catalysing recombination of said DNA.
19. (currently amended) A The hybrid recombinase according to claim 18 wherein the heterologous DNA binding domain is the DNA binding domain of Zif268.
20. (currently amended) A The hybrid recombinase according to claim 19 wherein the Zif268 DNA binding domain comprises a wild-type sequence starting from residue 2.
21. (currently amended) A The hybrid recombinase according to claim 18 wherein the Zif268 DNA binding domain is mutated at one or more amino acids.
22. (currently amended) A The hybrid recombinase according to claim 18 wherein the catalytic domain is mutated at G101 or at a position corresponding to G101 of Tn3 resolvase.
23. (currently amended) A The hybrid recombinase according to claim 22 wherein the mutation is G101S.
24. (cancelled)
25. (cancelled)
26. (cancelled)
27. (cancelled)
28. (currently amended) A The hybrid recombinase according to claim 18 wherein said catalytic domain comprises one or more additional mutations selected from the group R2A, E56K, G101S, D102Y, L105Q, V107M, V107L, V107F, Q105L, A117V, R121K, E124Q, E124A, A89T, F92S, M1031 or at

position corresponding to these mutations in Tn3 resolvase.

29. (currently amended) A The hybrid recombinase according to claim 28 wherein said catalytic domain comprises the mutations R2A, E56K, G101S, D102Y, M103I and Q105L or the positions corresponding to these mutations in Tn3 resolvase.

30. (currently amended) A The hybrid recombinase according to claim 29 further comprising the mutation V107F or the position corresponding to this mutation in Tn3 resolvase.

31. (currently amended) A The hybrid recombinase according to claim 18 wherein the catalytic domain is between 125 and 146 amino acids in length.

32. (currently amended) A The hybrid recombinase according to claim 31 wherein said catalytic domain is 125 amino acids in length.

33. (currently amended) A The hybrid recombinase according to claim 31 wherein the catalytic domain is 146 amino acids in length.

34. (currently amended) A The hybrid recombinase according to claim 31 wherein the catalytic domain is 140 amino acids in length.

35. (currently amended) A The hybrid recombinase according to claim 31 wherein the catalytic domain is 144 amino acids in length.

36. (currently amended) A The hybrid recombinase according to claim 18 wherein the linker sequence is selected from the group consisting of TVDRSSDPTSQ (SEQ ID NO: 17), GSGGSG (SEQ ID NO: 18), GSGGSGGSG (SEQ ID NO: 19), GSGGSGGSGGSG (SEQ ID NO: 20), GGGSGGG (SEQ ID NO: 21), GGGSGGGGSGGG (SEQ ID NO: 22), TVDRSSDPTSQTS (SEQ ID NO: 23), GSGGSGTS (SEQ ID NO: 24), GSGGSGGSGTS (SEQ ID NO: 25), GSGGSGGSGGSGTS (SEQ ID NO: 26), GGGSGGGTS (SEQ ID NO: 27), GGGSGGGGSGGGTS (SEQ ID NO: 28), NRVAQQLAGKQS (SEQ ID NO: 29), SDYTQNNIHO (SEQ ID NO: 30), TVDRTS (SEQ ID

NO: 31) and TS.

37. (currently amended) A The hybrid recombinase according to claim 36 wherein the linker sequence is TVDRTS (SEQ ID NO: 31).

38. (currently amended) A The hybrid recombinase according to claim 18 wherein the catalytic domain is a Tn3 resolvase catalytic domain.

39. (original) A hybrid recombinase comprising a Tn3 resolvase catalytic domain, which catalytic domain comprises the mutations R2A, E56K, G101S, D102Y, M103I and Q105L and V107F, linked to a DNA binding domain via a linker comprising the sequence TS, wherein said hybrid recombinase is capable of binding nucleic acid by way of said DNA binding domain and catalysing recombination of said DNA.

40. (currently amended) A The hybrid recombinase according to claim 39 wherein the linker comprises the sequence TVDRTS (SEQ ID NO: 31).

41. (currently amended) A The hybrid recombinase according to claim 39 wherein the catalytic domain is amino acids 1 to 148 of a Tn3 resolvase catalytic domain.

42. (currently amended) A The hybrid recombinase according to claim 39 wherein the catalytic domain is amino acids 1 to 144 of a Tn3 resolvase catalytic domain.

43. (cancelled)

44. (cancelled)

45. (cancelled)

46. (currently amended) A catalytic domain of a serine recombinase which has been mutated at G101 or at a position corresponding to G101 of Tn3 resolvase (SEQ ID NO: 2), wherein said catalytic domain contains one or more additional mutations at at a position selected from the group consisting of L105,

V107, A117, A89, F92, L66, G70, M76, T109 and R121; or a position corresponding to L105, V107, A117, A89, F92, L66, G70, M76, T109, and R121 of Tn3 resolvase (SEQ ID NO: 2).

47. (currently amended) A The catalytic domain according to claim 46 wherein the mutation is G101S.

48. (cancelled)

49. (cancelled)

50. (cancelled)

51. (cancelled)

52. (currently amended) A The catalytic domain according to claim 46 further comprising one or more additional mutations selected from the group consisting of ~~L105Q, V107M, V107L, V107F, Q105L, A117V, R121K,~~ E124Q, E124A, A89T, ~~F92S,~~ and M103I or at positions corresponding to these mutations in Tn3 resolvase (SEQ ID NO: 2).

53. (currently amended) A The catalytic domain according to claim 46 further comprising a one or more mutations of the surface residues corresponding to a '2,3' interface.

54. (currently amended) A The catalytic domain according to claim 53 wherein the one or more mutations of the surface residues corresponding to a '2,3' interface include R2A and E56K or positions corresponding to R2A and E56K in Tn3 resolvase.

55. (currently amended) A catalytic domain of a serine recombinase wherein said catalytic domain contains a single mutation at G101 or at a position corresponding to G101 of Tn3 resolvase (SEQ ID NO: 2) according to claim 46 further comprising a one or more mutations of the surface residues corresponding to a '1,2' interface.

56. (currently amended) A The catalytic domain according to claim 55 wherein the single mutation at G101 is G101S ~~one or more mutations of the surface residues corresponding to a '1,2' interface include L66, G70, M76, M103, V107, T109, A117, R121, and E124 or positions corresponding to L66, G70, M76, M103, V107, T109, A117, R121, and E124 in Tn3 resolvase.~~

57. (currently amended) A The catalytic domain according to claim 46 further comprising the mutations R2A, E56K, ~~G401S~~, D102Y, M103I and Q105L or the positions corresponding to these mutations in Tn3 resolvase.

58. (currently amended) A The catalytic domain according to claim 57 further comprising the mutation V107F or the position corresponding to this mutation in Tn3 resolvase.

59. (currently amended) A The catalytic domain according to claim 46 which is selected from the group consisting of Tn3 resolvase, Sin recombinase, yS resolvase, Tn 21 resolvase, 3 resolvase, ISXc5 resolvase, Gin resolvase, Hin resolvase, Methanococcus jannaschii.resolvase, 15607 resolvase, ccrAI resolvase, TN4451 resolvase, TP901-1 resolvase and OC31 resolvase.

60. (cancelled)

61. (cancelled)

62. (cancelled)

63. (cancelled)

64. (cancelled)

65. (cancelled)

66. (cancelled)

67. (previously presented) A kit for recombining a first DNA sequence and a second DNA sequence said kit comprising a serine recombinase according to claim 1.

68. (previously presented) A kit for recombining a first DNA sequence and a second DNA sequence said kit comprising a hybrid recombinase according to claim 18.

69. (cancelled)